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JUN 10 1953



THE VOICE

THE VOICE

ITS PHYSIOLOGY AND CULTIVATION

BY

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PREFACE

I AM aware that the comprehensive title of this work appears to be out of proportion to the small number of its pages. It has been my intention to put before the reader, in as few words as possible, a distinct outline of the vocal instruments, with the object of bringing the scientific and practical aspects of the voice into closer relation. If I should be so fortunate as to supply those, to whom the cultivation of the voice is a matter of importance, with materials to facilitate their work, and at the same time to indicate a line of scientific research to those who are in a position to pursue it, my object will have been attained.

W. A. A.

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I

INTRODUCTORY

EVERY one who approaches the subject of voice production is amazed and perplexed at the extraordinary diversity of opinion which exists among those who are to be regarded as authorities in the matter. Almost every master has a system peculiarly his own ; and we hear, not unfrequently, of those who, on changing from one master to another, are obliged to begin all over again to satisfy the requirements of the latter. Controversies arise from which the reader turns, when the strife has become entirely personal, richer only by the discovery that neither of the parties have any real foundation for their assertions. Books are written attempting to describe various

qualities of voice and the means of acquiring them, but they only add to the confusion, through the impossibility of conveying in words what is difficult even to hear when demonstrated.

I do not for a moment wish to criticise the methods and writings of professors of great experience, but merely to point out, that any teaching which has its foundation in the experience and speculation of one man, however just it may be in its conclusions, is nothing more than empiricism. It is this that produces all the existing confusion. Every teacher of singing or elocution feels entitled or even considers it necessary to have views and methods which are his and no one else's, and if his own limited experience is his only director, how can it be otherwise? The world, unfortunately, judges by ostensible results, and a few talented pupils are enough to establish the master's reputation. But the same process opens the door to the charlatan, who with little knowledge and some address has as good a chance of success as any one, in a field where scientific truth is not demanded.

There can be no doubt that the deficiency of scientific facts which can be clearly demonstrated, is at the root of the lamentable confusion of ideas in connection with the voice. Of all the physical sciences, that of Acoustics is the most neglected; and in spite of all the work of Helmholtz and others in this domain, its application to the human voice is regarded by the physiologist as interesting, but of no great practical value.

One of the difficulties to be contended with is the variability in the sense of hearing. There are scientists who can calculate and demonstrate, by means of suitable apparatus, sonorous vibrations which they are unable to appreciate by ear. Similarly physiologists who understand thoroughly all the physical and chemical processes of the human body, may be entirely devoid of that sense which would enable them to distinguish different tones of voice.

On the other hand, musicians are commonly not sufficiently masters of the subjects of physics and physiology to analyse and explain the real nature of the sounds which their ears delight in.

What we really want is a more definite understanding between the scientific and artistic representatives, which should serve as a foundation for all methods—some clearly defined physiological basis upon which singers and speakers may ground the production of their voices without danger of ruining them.

Unlike other musicians, the singer has to develop his instrument on his own person, and unless this is properly constructed, no amount of musical training can make him sing. He is born perhaps with organs favourable to the production of a voice; but their subsequent growth and formation depend upon the uses to which they are put, and a bad habit acquired may destroy what otherwise might have become a musical instrument.

There can be no doubt that the possession of a voice depends upon the formation of the organs in the body. In fact the instrument has to be built for the singer in the same way that the violin has to be made for the violinist. The problem of voice-building is as purely physiological as the making of violins is mechanical.

Hitherto it has been customary to wait until the growth of the body is complete, and then to try to make the most of what voice there may be. This is because the subject of physiological voice-formation has been greatly neglected. The would-be singer waits until his imagination and feelings make him wish to sing, and then he goes to the musician to teach him to do it, with the result, in nine cases out of ten, that his intentions remain always too far in advance of his physical possibilities.

The physiologist might have told him, if he had known, what he ought to have done earlier in life in order to increase his chances of growing a suitable instrument; nor indeed can it be regarded now as too late, only the older we get, the longer it takes and the more difficult it becomes, to establish new habits in, for example, such an unconscious organ as the tongue.

This new page in the science of physiology is in my opinion the only thing that can dispel the error and confusion resulting from the inaccurate knowledge of the vocal instrument

commonly displayed in the writings and utterances of the present day.

It must not be thought that I propose to make the whole art of singing amenable to exact scientific law. But I maintain that the formation of the instrument of song is a purely physiological matter and must be studied from that point of view. By way of analogy we must bear in mind that when Joachim plays on the violin, the sound he produces is in reality the consummate achievement of Stradivarius. To the great artist we owe the privilege of hearing it. Similarly the great singer is enabled, by his own physiological perfection, to carry his art to the limits of human expression.

The voice, then, must first be beautifully made and afterwards beautifully used. For the first part of the process we must look to the physiologist; for the second, to the musician.

Physical exercises are not easily made interesting; but considering the great importance of the voice in speaking, reading, preaching, declaiming, or pronouncing foreign

languages, it may justly be regarded as a necessary part of education to go through a certain amount of drudgery to attain some improvement in these, even when singing is not contemplated.

II

THE VOICE IN GENERAL

As there are two distinct mechanisms involved in the voice, I prefer to regard it as a combination of two instruments rather than one alone. They are both wind instruments, that is, they depend for their sound upon a current of air.

Their form is briefly as follows :—

From the lungs, which are the bellows, the air passes upwards through a single tube, the wind-pipe or trachea.

At the point where this tube expands to form the larynx, there are two membranous folds, the vocal cords, which can be drawn across the tube at will. Above these the larynx joins the pharynx in the formation of the passage commonly called the throat.

This is continuous with the cavity of the mouth in front, and with the nose above. So that above the vocal cords there is a hollow tube of somewhat complicated shape, first directed upwards (the throat) and then passing forwards into a hollow chamber (the mouth) and communicating with a second chamber above that (the nose).

The length of the passage cannot be altered much, but its internal dimensions depend upon the position of the tongue, jaw, and soft palate, and are capable of great variation.

So that in the vocal cords we have a vibratory instrument of the nature of a membranous reed, which has the function of producing the vocal sound and determining its pitch.

Whereas in the passage between the vocal cords and the lips we have a resonating instrument (Resonator) which, by varying its shape, influences the quality of the sound and impresses upon it the characters of language.

The two membranes which form our first instrument, of which the free margins are

called "vocal cords," are inserted close together in front, but behind they are attached to small cartilages which are moved by muscles in such a manner that the cords can be widely separated or brought close together. When apart, the air passes without hindrance as in ordinary respiration; but when closed, the current can only escape by forcing its way between the two margins which then form a slit. The elasticity of the cords yields to the pressure but recoils again to close the passage and renew the pressure, to which it again yields and so on; thus by virtue of their elasticity, the cords vibrate, and produce in the current of air, by alternate compression and relaxation, the powerful sonorous undulations which we recognise as vocal notes.

We must not fall into a popular error and regard the vocal cords as strings played upon by the wind as with a bow. That would only be true if the sound came from the bow and not from the string. The reed, of the membranous variety of which the vocal cords are an example, is a mechanism for producing vibrations in the air, and the vibrations of its solid

substance are comparatively inaudible. It is important to make this point quite clear. The solid substance of the cords certainly does vibrate and produces a note identical in pitch with that of the air stream; but it is so much feebler than the powerful note imparted to the stream of air by alternately opening and closing the passage, that it may practically be disregarded.

The pitch of the note is regulated by the tension of the vocal cords, and there is a special group of muscles for this purpose, which by tightening or relaxing the cords can maintain any rate of vibration within the compass of the voice.

Thus we see that the cords are of the nature of a reed, are a powerful sound organ, and determine the pitch of the vocal note.

The other instrument is the Resonator. It consists of the irregular tube extending from the vocal cords to the lips.

By the physical law of resonance every hollow space containing air is capable of accommodating only those undulations which fit into its dimensions. If you blow across

the end of a tube, a note is heard which can be made lower by lengthening and higher by shortening the tube. These notes are the resonances which belong to each particular length of tube. More complicated cavities have complex resonances, but as a rule, the lowest note fitting the longest diameter is the ruling resonance of the cavity. When the sonorous undulations of a note are passed through a cavity, those which agree with its resonance are accentuated or reinforced, and those which do not are antagonised and weakened. The effect of a resonating tube varies according to the strength of the vibrations passing through it. Thus in the case of the obœ and clarinet, the high-pitched flexible reed produces no particular note of its own, but evokes the resonant note of the tube beyond it. But in the voice the powerful reed maintains its own note and pitch, and the Resonator above it only adds to it its proper resonance, and so imparts to it some special character or quality.

I have called the Resonator an instrument

by itself because by movements of the tongue and lips it can assume a great variety of shapes with distinctive resonances, and in this way can add to every note of the vocal cords the series of qualities which are known in language as the "vowel sounds."

In the common use of the voice both instruments are used together. The muscles of the larynx are varying the tension of the vocal cords and producing notes of corresponding pitch — while the tongue and lips are varying the shape of the Resonator and applying to the vocal notes the qualities of language.

In ordinary speech the Resonator performs the movements and assumes the positions which we employ as the acknowledged code of signals or words to express our thoughts. The vocal cords are made to vibrate at the same time, and a sound is produced which reaches the ears of others with a pitch determined by the cords, and a character determined by the Resonator. As a rule, we pay but slight attention to the vocal note in speaking, and so long as we are heard and

understood our object is attained. But when—as in singing—words have to be spoken upon a series of vocal notes laid down for us, our usual habits of speech are inadequate. The words are set before us for the Resonator to perform, and above it a line of music indicates to the vocal cords what they have to do at the same time. A song is practically a duet, and the art of singing depends largely upon the full and independent use of both these instruments in such a manner that they combine without sacrifices on either side. The most perfect vocalising may be spoilt by bad pronunciation and *vice versa*—and it must not be forgotten that the singer has two composers to satisfy ; the poet who made the words, and the musician who made the music.

Regarded in a true physiological light the vocal cords form the instrument by which we make ourselves heard, and the Resonator that by which we make ourselves understood.

It is obviously impossible to study the vocal cord instrument entirely by itself, as its sound must necessarily pass through the

Resonator before it reaches us. Therefore in singing a note it is impossible to avoid its being accompanied by a vowel or sounding consonant of some sort. It is, however, possible to use the Resonator alone without any vocal vibration, and this is what takes place in whispering. A whisper is simply the note of the Resonator evoked by a current of air passing through it, when the vocal cords are not near enough together to be made to vibrate. The rushing sound is caused by the narrowing of the tube at the glottis, and the effect is the same as when, to determine the resonance of a pipe, we blow into one end of it.

By whispering a number of vowels it soon becomes evident that each one has a resonant note of its own, and in this way it is possible to learn with some exactitude how the Resonator is being used. The movements of the tongue and lips are the means we possess of changing the resonance, and the corresponding acoustic effects are of the highest importance to the tone of the voice. Every vowel sound corresponds to a position or shape of the

Resonator, and in singing this has to perform the double office of rendering the vowel distinct and of enriching and enhancing the beauty of the vocal note. In talking, distinctness is all that is attempted, but we find it necessary to do something more in singing, and what will do for the one is not enough for the other. The difference depends entirely upon the good or bad resonance of the vowel; and the much-prized "open throat" is cultivated, to secure the better resonance which a wider cavity must necessarily give.

We determine what the vowel shall be by the shape of the Resonator, but according as its capacity is greater so will the vocal note be made more sonorous by the strengthening of the longer waves of sound.

Air is the medium by which sound is carried to the ear, and solid vibrating bodies such as strings require the assistance of a sounding board to transfer their vibrations to that medium and make them amenable to resonance. But the mechanism of a reed acts directly upon the air, and its solid surroundings are comparatively of little import-

ance. There is therefore no need for a sounding board in the human voice, although we not infrequently hear it spoken of. The sympathetic vibrations in the cavity of the nose are communicated to it, when there is no direct opening, through the soft palate which is stretched between the nose and the Resonator like a drum, or what is technically known as a diaphragm.

The moist walls of the throat and mouth are most unfavourable for the transmission of sounds, but every air space in connection with the organs of respiration may have some share in the voice, by adding to it a resonant note.

I have been told by an expert that he could hardly distinguish a trombone made of paper from one of brass, and there have been instances of organ pipes made of brown paper serving their purpose for years before being found out. This is a decided proof that the size and shape of an air space is of much greater importance to resonance than the material of which its walls are composed, and induces me to banish from consideration all

the solid vibrations of the chest, throat, and face as sources of sound. They occur rather as the results of strong resonant vibrations in the air-column, and we recognise them in our sensations when the voice is full and good. But we have no ground to believe that these solid vibrations have any influence outside our own bodies, or we might reasonably expect that the wearing of a comforter or an overcoat would impair the tone of the voice.

The vocal cords can perform a scale of notes extending through two octaves and more, while the Resonator remains stationary. The vowel continues then the same on every note, but the resonating effect must in each case be different. It is, however, in the nature of reeds that the low notes are soft and buzzing, whereas the high notes are sharp and penetrating. It would, therefore, be desirable that the lower notes should be brightened and the upper notes mellowed by applying to them resonators to accentuate in the first case the upper, and in the latter case the lower harmonics. This is exactly what occurs in the voice. The stationary

Resonator, as the pitch of the note rises, strengthens proportionately lower harmonics, and this is so markedly the case that when the upper few notes of the voice are reached some effort has to be made to keep the Resonator as large as possible to counteract the tendency to shrillness. Some singers resort to the expedient of slightly closing the lips to make the vowel sound more sombre for this purpose. Anyhow, with the greater tension of the vocal cords there is an involuntary drawing up of the soft palate which increases the capacity of the mouth and lowers its resonance.

The enrichment of the vocal notes by accentuating harmonics should be regarded as distinct from the production of the vowels, which are due to definite resonant tones added to the sound.

The consonants are also formed in the Resonator, but being chiefly noises belonging to certain ways of opening and closing the vowels, they take less part in the actual resonance of the voice, although they influence it to a great extent. They are essential to the

distinctness of language, and have to maintain that character in dividing the vowel sounds from one another without encroaching upon them.

The necessary equipment for the best uses of the voice may then be summed up as follows:—

1. Full capacity and strong control of breath.
2. Well formed, capacious Resonator, and control of tongue, lips and palate.
3. Well adjusted vocal cords—guided by a
4. True ear, or accurate perception of sound.

These are not placed in order of merit, for they are all equally essential.

I propose to consider them in this order because the first and second subjects are entirely physiological, and have for their aim the teaching of those unconscious habits of breathing and pronouncing which come from proper exercise and growth.

The third and fourth subjects, although having a physiological basis, carry us soon into regions where scientific analysis cannot follow.

The saying of Pacchiarotti, quoted by Mr. Shakespeare in his work on the *Art of Singing*, that "he who knows how to breathe and how to pronounce, knows well how to sing," gives us good authority for hoping that by mastering the first two, the difficulties of the rest may at least be diminished.

They may, indeed, be regarded as preliminaries to vocal training, and can be entered upon early in life, that is, long before the vocal cords are in a condition to be trained at all.

III

THE BREATH

It is not necessary to enter into a detailed description of all the muscles involved in the act of respiration. What is much more important to the singer is the sensation in his own body of a properly managed breath. For vocal purposes a deep breath and a strong control over it are what must be acquired; for not only is it necessary to take in sufficient air to last for a prolonged period, but its exit has to be regulated so that in a long phrase the end may be as well supplied with force as the beginning, and at any points within it the appropriate accents may be given their due prominence.

Under ordinary circumstances the breath is taken easily and then let out quickly, after

which follows a pause; but in singing, the reverse is the case, for the breath must often be taken in quickly and let out gradually, and there may be no pause before another breath has to be taken. It is also expected that a large reserve of air should always be kept in the lungs, for much of the volume of the voice, as well as the control, is lost when the muscles of the chest are too much relaxed. Hence the singer's aim is to increase the capacity of his lungs and to strengthen those muscles which allow him to distribute his breath with proper economy. It may here be noted that it is not by any means for singing loud that the most breath is required. Sometimes soft passages require quite as much or more, and certain consonants, such as those which are "aspirated," cost a good deal of breath. It will always be found more difficult to maintain a long phrase with words than one upon a single vowel.

Our natural frequency of breathing is about sixteen times a minute, and in continuous singing it not infrequently happens that the opportunities of taking breath occur

very much less often, and the increased reserve has to be kept up at the same time. An increased capacity becomes therefore a vital necessity or the singer will be in want of air. It is also a most desirable acquisition for other than vocal purposes, for the benefit to general health of the full expansion of the lungs can hardly be over-estimated.

It is best to study respiration in our own bodies, and to watch and feel carefully the movements which we must cultivate in order to obtain the maximum of breath and control, with the minimum of effort.

The lungs are completely enclosed within the ribs and occupy the whole region of the chest, with the exception of a small compartment in front and to the left, containing the heart, with which we are not concerned. All the lower part of the trunk uncovered by ribs is the Abdomen, containing the digestive organs, which is separated from the chest or thorax by a large muscular membrane, the Diaphragm. This partition is, as it were, the roof of the abdomen and the floor of the thorax, and bulges upwards into the latter like a dome.

In order to breathe we have to increase the capacity of the chest and the air rushes in through the nostrils or mouth. There are two ways of doing this. One by raising the ribs, and the other, by contracting the diaphragm. The first of these expands the chest laterally and forwards, and the other extends it downwards. Proper physiological breathing is the conjunction of both movements.

The upper ribs are not nearly so movable as the lower ones. In fact the first and second can only be raised very little, and that by a great effort. The lower ribs, especially those which by means of their long flexible cartilages are attached to the lower end of the breast bone, are much more easily raised—and their action has also more effect as they correspond to the widest part of the chest. In tranquil breathing the upper part of the chest remains still, and lower part expands, and the lower end of the breast bone advances. At the same time the diaphragm also descends a little. This is the method adopted in sleep, and is the proper way of obtaining the most air with

the least trouble. There is a difference between men and women in this respect, namely, that women use the ribs more, and the diaphragm less than men, but the rule with regard to singers of both sexes, and all who wish to increase their lung capacity, is the same. This may be stated as follows:—

* Cultivate and develop the natural combination of costal and diaphragmatic breathing together, without ever resorting to the extremes of either.

When the lower ribs expand it becomes possible to contract the diaphragm without causing injurious downward pressure upon the abdominal organs. The increase in the circumference of the chest, due to raising the lower ribs, also increases the circumference of the upper part of the abdomen, and the organs situated there may be pressed forwards by the diaphragm, as they naturally must be, without causing any distension of the lower part. When the diaphragm descends, the organs which are immediately under it must necessarily also move—as they are for the most part suspended from its

under surface—at the same time its strong fibres (the pillars) attached to the spine, by their contraction, thrust them forwards. This accounts for the bulging of the upper part of the abdomen in proper diaphragmatic breathing, and must be carefully distinguished from the distension of the lower part of the abdomen due to pressure upon the intestines from above.

The increased capacity of the lungs to be acquired by the singer must confine itself to the increased expansion of the lower ribs, and the proportionately increased contraction of the diaphragm, which is an exact copy of ordinary physiological breathing only on a larger scale.

The greatest movement takes place just below the lower end of the breast bone, and to that spot the attention must be drawn when practising breathing. It is a help to place the hand across the arch formed by the ribs, or rather their cartilages, in front. On breathing deeply the arch widens, and the abdominal wall within it bulges forwards (see Figs. 1 and 2), while the upper part of the

chest and shoulders, and the lower part of the abdomen, hardly move.

The best exercises are those that gradually increase the power of the respiratory muscles without straining, and should be slow, even, and rhythmic. As it is essential that respiration should be carried on without interfering with other movements of the body, I would advocate free movement while exercising. It is more likely to make the breathing unconscious, and prevent the stiffness which is so often the singer's ruin both on and off the stage. I employ the simple act of walking, as that also supplies a rhythm to regulate the breathing by.

With the mouth closed, and having a proper care that the movement of breathing is at the right place,—above the waist-band—slowly breathe in through the nose taking three steps in walking. Then for the next three steps hold the breath, and let it out again quietly through the nose during the next three. This may be done anywhere amongst other people, for it must be our aim not to betray in facial expression, or

bodily movement that we are practising respiration. There must be no rigidity or fixity of expression, and after a little practice it will be found quite possible to exercise breathing while walking or bicycling in the streets.

The number of steps to each part of the exercise is gradually increased, and it is better not to attempt a greater number than can be continued for a length of time. Nine or ten to each part, that is to say twenty-seven to thirty for each complete respiration, is very deep breathing, and difficult to maintain for long, as at the end of it you will probably be in need of air. It is then better to return to a smaller number, for an exercise which can be continued easily will do more positive good than the occasional accomplishment of records.

Another good exercise is to breathe naturally and regularly while maintaining a large reserve of air, which may be changed occasionally. It will be found necessary to hold the back straight, but there should be no stiffness in the attitude, in spite of the continuous expansion of the lower ribs.

The accompanying diagrams, Figs. 1 and 2, show the movements of the chest and abdomen in proper breathing. The expansion of the circumference of the chest at different levels is given in Fig. 2, and represents the difference between tape measurements taken at rest, and at the end of a deep inspiration. This demonstrates how by attending particularly to the arch in front, and attaining the maximum of movement there, the best results may be anticipated.

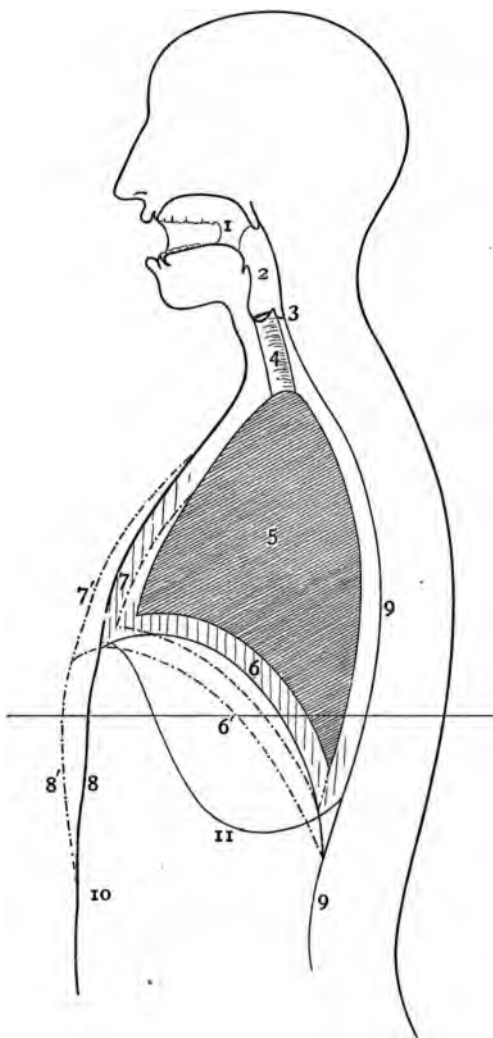


Fig. 1.—Side View of the Organs of Respiration.

To follow p. 30

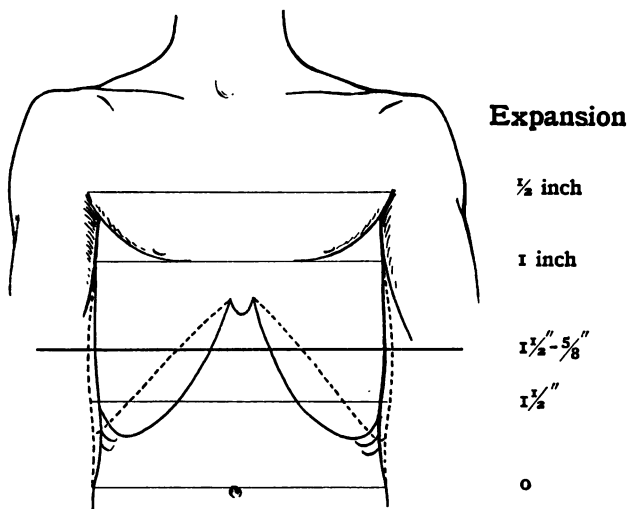


Fig. 2.—Front View of the Chest showing Line of Maximum Expansion.

To face Fig. 1

KEY TO FIG. 1.—1. Mouth. 2. Throat. 3. Vocal cords. 4. Windpipe. 5. Lungs. 6. Diaphragm. 6¹. Diaphragm contracted. 7. Breast bone. 7¹. Breast bone raised. 8. Upper abdomen. 8¹. Upper abdomen expanded. 9. Spine. 10. Umbilicus. 11. Outline of ribs.

IV

THE RESONATOR

THE passage from the vocal cords to the lips is about $6\frac{1}{2}$ to 7 inches long. It has two parts—one vertical, corresponding to the larynx and pharynx and the other horizontal, composed of the mouth. Each part is about the same length and joined to the other at a right angle, so that the Resonator may be regarded as an irregular tube with a rectangular bend at its middle.

The walls of the vertical portion are composed of the bones of the spine behind and the cartilages of the larynx and loose muscles of the pharynx at the sides—and the thyroid cartilage and epiglottis and root of the tongue in front.

This part of the passage can be enlarged

slightly by traction upon the larynx from below, by looseness of the pharyngeal muscles, and still more by the forward movement of the root of the tongue.

The horizontal portion or mouth has the palate, hard and soft, for its roof, the jaw, teeth, and cheeks for its walls, and the tongue for its floor.

The interior dimensions of this cavity can be greatly varied by moving the jaw, the soft palate, and the tongue, and its orifice is regulated by the lips.

The cavity of the nose is entirely enclosed in bone and cartilage, and is consequently immovable, but its connection with the Resonator is regulated by the soft palate.

It will be seen from this description that the mouth is controlled by the movements of jaw, tongue, and lips, and is therefore best adapted to the purposes of language. The throat, on the other hand, is less actively movable but contains the vocal cords, and must therefore have great influence on their vibrations without taking much part in the formation of words.

This short irregular tube is the real body of our vocal instrument. Every sound must necessarily pass through it. Every vowel and consonant must be formed within it and the whole character of the voice depends upon the way we use it.

As I have already said, its acoustic effect is due to the resonances yielded by its hollow spaces, and we must study closely what these are. The whispered vowel is a collection of numerous resonant notes, and it is often difficult to hear anything more than a rushing sound of no particular pitch. But by expanding the chest properly and keeping a good reserve of air and by opening the mouth a convenient distance (about one inch between the front teeth) and keeping the tongue well forward, a distinct resonant note can soon be heard which should belong to the whole length of the Resonator. Any contraction of the muscles surrounding the Resonator encroaches upon the spaces and interferes with the resonances. Thus the resonance of the whole tube may be destroyed by bringing the palate and the base of the tongue together, for

then the resonance of the mouth alone is heard.

The vowel sounds in the whispering voice have been analysed by many of the great German physiologists and physicists, and the accompanying table of their results for U, O, A, E, I, taken from Helmholtz, is extremely instructive.

	U	O	A	E	I
Reyher . . .	c	d [#]	$\left\{ \begin{array}{l} a \\ c' \end{array} \right.$	f'	c''
Hellwag . . .	c	c [#]	f [#]	b	c'
Flörcke . . .	c	g	c'	a'	c''
Donders (Helmholtz) f'	d'	b'b	c''' [#]	f'''	f'''
Donders (Merkel)	$\left. \begin{array}{l} e \\ f \end{array} \right\}$	e	b	c'	f''
Helmholtz . . .	ff'	b'b	b''b	$\left\{ \begin{array}{l} b''' \\ f' \end{array} \right.$	$\left\{ \begin{array}{l} d'''' \\ f \end{array} \right.$
Merkel . . .	d	f [#]	a	d''	a''
Koenig, . . .	b b	b'b	b''b	b'''b	b''''b
Trautmann . . .	f''	c'''	f'''	a'''	f''''

It will be seen that they differ enormously from one another in their results. So much so, that one cannot refrain from thinking that some of them must have been mistaken. This, however, need not have been the case if we consider that we are not told anything about the individuals examined, nor the way

they pronounced, nor the extent to which the mouth was opened, nor any of the details which we know must have some influence upon the resonances. We are able, however, to deduce from the table the fact that there are no universally fixed resonances for any particular vowel sound, if it tells us nothing more. Nevertheless I am convinced that when all the conditions are satisfied which bring about the best and fullest use of the Resonator, beyond the differences due to sex and size, the resonances will be found to be much more constant.

If you direct a number of people to whisper the vowel A, you will notice that some hardly open the mouth, and that most of them allow the tongue to go back into the throat, and do various things which destroy the proper resonance of the whole tube. A number of different resonant notes will be obtained, and in some it will be difficult to fix any note at all. But if you first insist that the mouth must be open a certain distance, let us say an inch between the front teeth, and that the tongue must lie on the floor of the mouth

with its margin against the lower teeth, and that the chest must be partly expanded, and that the breath must meet with no obstruction, except at the glottis, where the rushing sound of a whisper is properly produced—then will the resonances be similar, and not otherwise. There will be variations between full grown men and women of one or two tones; and between different men and different women of one or two semi-tones, and not much more. This can readily be understood if we consider that if the tube is 6 inches long, the variation in length alone of about $\frac{3}{4}$ inch would only make a whole tone difference in the resonance—and differences between actual measurements both in length and breadth of the tube in different individuals would not account for wider variations than are obtained by experiment. But when we examine the faulty uses of the Resonator the differences are much greater. By assuming certain positions of the organs of speech some people can imitate the voices of others—making use of all kinds of resonances which are not natural to them. In fact people with faulty pronunciations are

the easiest imitated, and their peculiarities generally lie in some habit of the tongue, which makes it a question of distorted resonance rather than of pitch.

In ordinary conversation much faulty pronunciation is overlooked so long as the words themselves are intelligible—but in singing and public speaking every misuse of the Resonator is magnified and does not pass unnoticed. It must not be thought that good public speaking is effected by merely raising the voice. Those who have tried it have often found out their mistake only after the voice has been ruined. Increased force in the vocal vibrations requires a fully open Resonator, or the sound will be broken up into the harsh, shrill tone which is always associated with a sense of strain. On the other hand, a properly managed Resonator will make the voice clear and far-carrying without any extra pressure upon the cords.

The question which will naturally be asked is, how are we to know when we use our Resonator properly?

The answer is simple enough; by getting out of it as much resonance as possible. We

have the means of knowing what resonances are there, by studying the whispering voice ; so that we only have to know what these resonances ought to be and then try to acquire them. We must find for every vowel-sound that position of the Resonator which gives us the maximum of resonance.

Helmholtz has shown that a narrow tube has a resonance limited to the particular note which has a wave-length corresponding to the length of the tube : but that a wider tube is not so selective. It resounds to its own particular note rather less forcibly, but it also reinforces the neighbouring notes, some tones above and below it.

This demonstrates the advantage of a wide Resonator, which has to reinforce every note in the compass of the voice.

Apart from the reinforcing function of the Resonator we must remember the distinctness of the vowel sound—so that the problem before us is to make every vowel clear and unmistakable, and at the same time to give it the fullest resonant quality. There must certainly be no straining, as that would cause

us to break down from fatigue—but we must adopt the easiest methods to secure for every vowel the widest and roundest position of the Resonator—which gives us the deepest resonant note.

The deepest resonant note is obtained by giving the Resonator full play to relax itself to its widest dimensions, and this is the physiological explanation of the “loose and open throat” which it is necessary to acquire for proper singing, as all contractions of the muscles surrounding the throat and mouth encroach upon their resonant cavities.

V

THE VOWELS

THE physiological arrangement of the vowels according to their resonances, starting with the lowest, is—

U	O	A	E	I
(oo)	(or)	(ah)	(eh)	(ee)

(*Note.*—The Italian pronunciation is always adhered to in these pages, as in all works on the subject—from the fact that it is the purest.)

The vowel A has the central, normal position of rest, from which the Resonator approaches the other vowels. By partly closing the lips the resonance is made lower to form O and U, and by raising the tongue it is tuned higher to form E and I.

The position for A which I regard as the

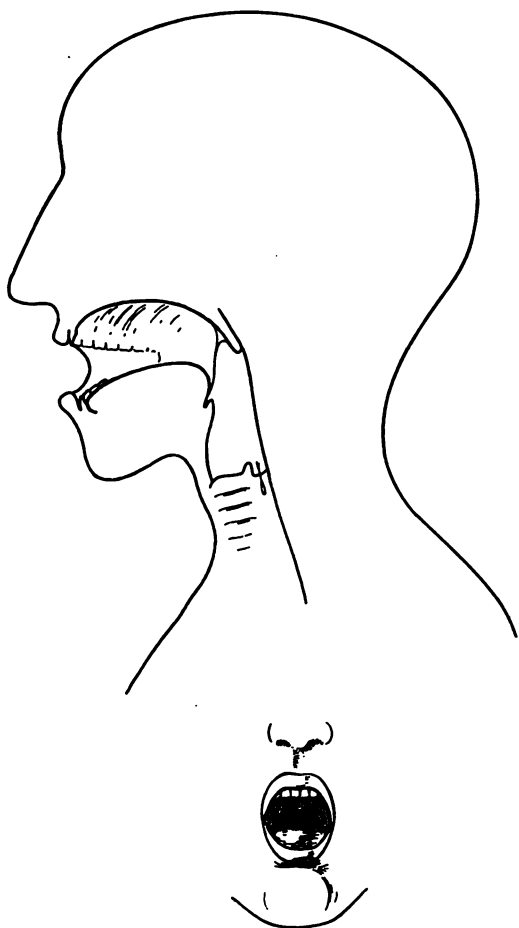


Fig. 3.—Side and Front View of the Position of the Vowel A.

To face p. 41.

best is that which most nearly approaches complete rest, compatible with full resonance.

The *jaw* hangs open about an inch between the front teeth.

The *lips* lie at rest upon the teeth.

The *tongue* lies at rest upon the floor of the mouth, with its margin against the lower teeth, just as it would in quiet breathing through the nose when the mouth is shut.

The *soft palate* is raised just enough to shut off the cavity of the nose to prevent the sound being nasal. This is the only muscular action, except the chest expansion sufficient for a full breath and good reserve of air.

I do not advocate the pressing down of the back of the tongue, which increases the cavity of the mouth rather at the expense of that of the throat, and produces a hollow, plummy tone. The flat and forward position of the tongue gives more freedom and natural timbre, and leaves the throat looser and more open. (See diagram, Fig. 3.)

The resonance of this position, which I

entitle the Basic Resonance, is the most important in the voice, and differs somewhat, as has already been pointed out, in individuals and in the two sexes, on account of the natural variations in the size of the tube.

A common resonance for A among men is b" or c", and in women d" or e"b, and from this all the other vowel sounds take their distance.

To hear this resonance in your own voice it is only necessary to assume the position indicated, and then breathe out forcibly with an aspirate. With the assistance of a pianoforte the resonant note can be found.

When the resonance of the whispered A is obtained, a tuning-fork of the same pitch, when held in front of the mouth, will be strongly reinforced. Some interesting facts may be noticed in connection with this experiment. If the palate is allowed to fall, and base of the tongue to rise, as would take place when whispering the vowel A through the nose, without moving the mouth, the tuning-fork when held in front will sound much shriller, from the fact that it is now reinforced

by a resonance an octave higher than the one before. In fact, by bringing the palate and the tongue together, the Resonator has been divided in two, and the front segment only resounds to the tuning-fork, the back one being shut off. That this should give us a resonance of an octave higher is an explanation of the shrill and penetrating quality of a voice produced with a contracted throat.

In an average man the resonance will be about c'' , equivalent to that of a tube, closed at one end, about 6 inches long and 2 inches in diameter, the frequency of its vibrations being 528 per second. This is the c'' occurring in the third space of the treble clef, which, it will be noted, is altogether above the compass of the vocal cords in a man's voice, the highest tenor note just reaching it.

In the case of a woman with a resonance for A of $e''b$, that is, of 634 vibrations, the comparatively short vocal cords of a soprano voice can be made to vibrate to a much higher pitch, and such vibrations are in great need of resonation to prevent their being too shrill. So that they benefit by having a propor-

tionately larger Resonator. It is a noteworthy fact that the great beauty of a soprano voice often shows itself at the point where the Resonator is capable of resounding the primary note—that is, from $e''b$ upwards.

The Basic Resonance for A being once fixed, and made clear, full, and unmistakeable, we must proceed to form the other vowel sounds from it. By diminishing the orifice of the mouth the Resonator can be tuned downward considerably. It is still of the utmost importance to keep the tube as wide and loose as possible.

The *jaw* must remain open as for A, with an inch between the front teeth.

The *tongue* flat in the mouth as for A.

The *palate* as for A.

The *lips* are brought forwards and together so that there is most movement at the corners of the mouth, which come forward so as to maintain the roundness of the orifice as far as practicable. (See diagrams, Figs. 4 and 5.)

Thus the movement for lowering the resonance should be performed entirely by the

lips, and in this way the entire Resonator may be tuned down a fifth without difficulty.

It will be noted that the movement of the lips not only closes the mouth but also elongates its cavity forwards. Both movements tend to lower the resonance.

By lowering the resonance a fifth, an easy position is obtained for the vowel U (oo). This is the lowest of the resonances and the most closed position of the lips. By exaggerating the movement it may be made lower still—but, I think, without advantage. There is, however, a good reason for having it a fifth lower than A.

There are three varieties of O, each with a resonance of its own—and they can with convenience be arranged upon the three notes intervening between U and A.

The round O as in “owe,” “hoe,” “oh”!; the medium O as in “or,” “more” (the Italian O); and the short O as in “on,” “hot.”

By this arrangement the five vowel sounds:—

U	Ō	O	Ö	A
(who)	(owe)	(or)	(on)	(art)

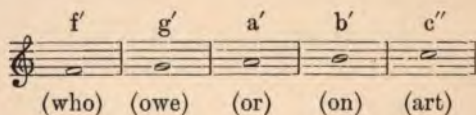
form the first five notes of a scale which is heard on whispering the words given as examples, according to the rules laid down for maintaining the maximum capacity of the Resonator.

It may be objected that this is a somewhat arbitrary proceeding—and no doubt it is so—but Nature only settles for us what the Basic Resonance is to be. All the others we have to settle and acquire for ourselves. And if the arrangement suggested secures the maximum of resonance in the easiest way—then it has the highest scientific recommendation that can be awarded to any process of education.

For convenience these resonances are numbered

I	II	III	IV	V
U	O	O	O	A

and when A is c'' , the others will be on the notes below it thus:—



(N.B. Whispered only.)

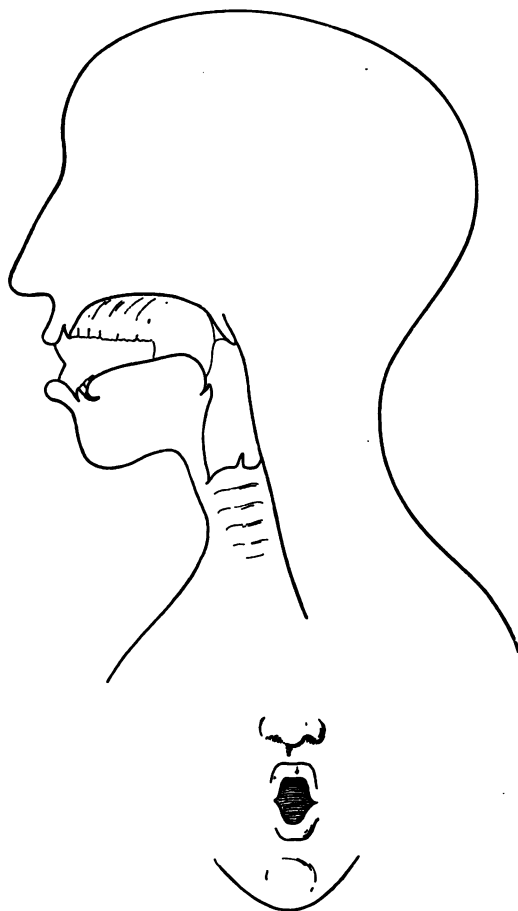


Fig. 4.—Position of the Vowel O (Italian).
To follow p. 44.

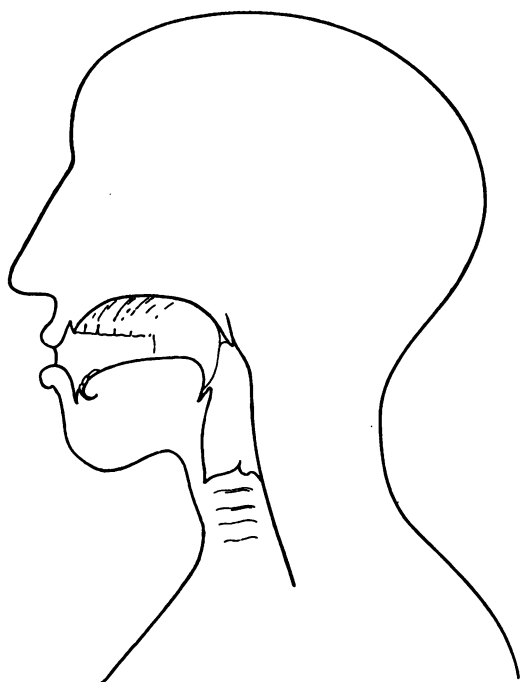


Fig. 5.—Position of the Vowel U.

To face Fig. 4.

The remaining vowel sounds are obtained by tuning the Resonator upwards. There is, however, a difficulty in this which complicates their formation. It is not possible to shorten the tube in order to make the resonance higher—at least not the whole tube. The resonance of the mouth cavity, however, can be raised by the upward and forward movement of the base of the tongue—but this, at the same time, increases the capacity of the throat. So that, whereas the resonance of the mouth is raised, that of the throat is lowered. The effect, therefore, is the production of a double resonance, one for the front and one for the back segment of the Resonator which sound together. The nature of such an arrangement would point decidedly to the advantage of some agreement between these resonances, and that is what actually happens in the case of the pure vowels E and I.

I have found by repeated experiment that in raising the base of the tongue sufficiently high to tune the mouth resonance up a sixth, the throat resonance may be made to fall a third—so that a compound is obtained, of

which the front resonance is the octave of the back one. This is the physiological position for the vowel E, and the acoustic relationship of its component resonances is a matter of great importance to the purity of its sound.

By raising the base of the tongue still higher, so that the mouth resonance is tuned up an octave, the back resonance can be made to descend a fifth. This establishes the relation of a twelfth which characterises the components of the vowel I.

It is the front resonance which is heard externally in ordinary speech—but in the fuller use of the voice, the deep resonance of the throat acts powerfully upon the vocal note and at the same time augments the front resonance, which in the case of E is its first, and in the case of I its second harmonic. Thus, the front resonance of these two vowels gives them distinctness, but their sonority is acquired from their back resonances.

I do not maintain that the resonances of a sixth and an octave above the normal A are the only ones which could produce the

effect of the vowels E and I. By various movements, which I regard as mal-positions of the Resonator, other resonances can no doubt be produced, yielding a sound which would be recognised as either of these vowels. But I only wish to insist upon the acoustic advantages of the vowel sounds when produced in the manner now to be described. (Compare diagrams, Figs. 6 and 7.)

The *jaw* is open as for A.

The *lips* are at rest upon the teeth as for A.

The *palate* shuts off the nasal cavity as for A.

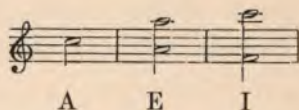
The *tongue* rises at its base from its position for A to the level of the soft palate and presses against the back upper teeth for E, to the level of the hard palate for I, and in both cases the tip lies against the back of the front lower teeth and remains broad and flat from side to side.

The whole movement is performed by the tongue, the base of which forms a transverse ridge which rises and comes forward in the

mouth, touching the upper teeth with its margin, and divides the Resonator into front and back segments.

In whispering A, E, I, successively according to this method, the front resonance is heard to ascend to the sixth and octave above that of A. The back resonance may either be heard with a stethoscope placed upon the neck, or in your own person by stopping the ears. The resonant notes in the latter case are conveyed to your ears from inside, and can be heard distinctly to fall successively to a third and a fifth below the Basic Resonance for A.

Hence if our Basic Resonance is c'' there will be produced the double resonances $\left\{ \begin{matrix} a'' \\ a' \end{matrix} \right.$ and $\left\{ \begin{matrix} c''' \\ f' \end{matrix} \right.$ or when written on the stave:



When E and I are pronounced in the common way by bringing the tongue forward and also closing the teeth, both front

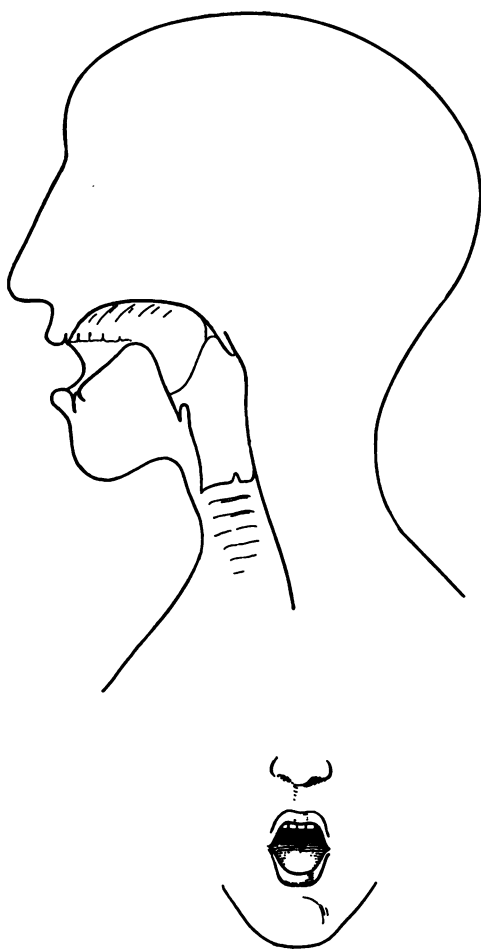


Fig. 6.—Position of the Vowel E.

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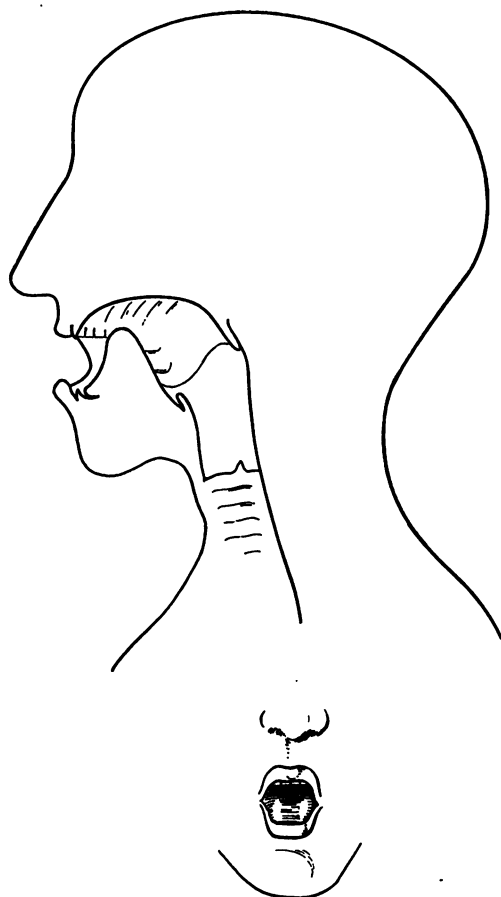


Fig. 7.—Position of the Vowel I.

To face Fig. 6.

and back resonances are heard. But when the front resonances are the same as we obtain with the open mouth, the back resonances are neither so low nor so distinct. The character of the vowels necessitates the tuning of the front segment upwards, but if the jaw is closed in the process there will no longer be the same necessity for the forward movement of the tongue, and consequently the enlargement of the throat which that produces will not be so great. Retraction of the corners of the mouth is another way of saving the forward movement of the tongue, and the resonance of the back segment suffers accordingly.

There is a good deal to be said theoretically about these results, but until a series of practical experiments in connection with them are completed, I do not intend to enter into that side of the subject. It remains a fact that these notes can be heard, and it will not affect our practical purpose if the sounds are actually an octave higher than I have written them. It is often difficult to decide upon the octave to which a whispered resonance belongs—and

I am unwilling to complicate by a theoretical discussion the practical aim of these suggestions, which is to determine the method of using the Resonator to the greatest acoustical advantage. It is my conviction that this object is attained if we can hear in our own voices the double resonances for E and I which I have described, because they are the result of the widest and fullest position of the Resonator for these vowels.

In English there are several other vowel sounds which have yet to be accounted for, some of them are simple and can be located on definite resonant tones, while others are compound and are formed by passing from one resonance to another.

Between A and E there is an interval of a whole sixth, and within these limits are to be accommodated several rather indefinite sounds such as the *u* in "up" "dull," *er* in "her," *a* as in "hare," *α* as in "hat," and *e* as "pet," some of which are also spelt with other letters, as the list of examples will show.

By placing these sounds upon the notes

between A and E, a good resonance is given to each, and we have—

(when the basic resonance is c'')

V	VI	VII	VIII	IX	X
c''	d''	e''	f''	g''	$\left\{ \begin{array}{l} a'' \\ a' \end{array} \right.$

art hut her hare hat let late

Between E and I there is yet another intermediate note upon which we find the short i as in “hit,” thus—

X	XI	XII
$\left\{ \begin{array}{l} a'' \\ a' \end{array} \right.$	$\left\{ \begin{array}{l} b'' \\ g' \end{array} \right.$	$\left\{ \begin{array}{l} c''' \\ f' \end{array} \right.$

fate fit feet

which completes the scale.

(*N.B.*—In whispering these examples, the mouth must always remain open as for A.)

The shallow α as in “hat” is difficult to locate; but I believe its position is between the short e , as in “let,” and the somewhat deeper α in “hare,” but these sounds are some of the most difficult in the English

language, and may demand further study before they can be fixed finally.

Thus all the vowel sounds between A, which is the normal centre, and I, which is the highest, arrange themselves in a regular scale, each note of which represents a degree of tongue movement, as that organ comes upwards and forwards in the act of tuning the resonance of the mouth. As the front segment of the Resonator is made a little smaller at every step of the scale, the back segment becomes a little larger.

It will be noticed that whereas the front segment in rising from A to E performs a scale of six notes, the back segment only falls a third, and it becomes therefore more difficult to fix the back resonance for each of the intermediate vowels. But between E and I the rise of the front resonance is the same as the fall of the back one, and their resonances can both be heard distinctly moving in contrary directions.

To these resonances we have now to add those below that of A—and we complete the Resonator Scale of twelve notes which I have

numbered with the numerals I to XII to indicate their positions, not their pitch. For if we say that the resonance of "er" is VII we mean that it must take that position on the scale, but do not ascribe to it any particular resonant pitch.

The Resonator Scale (see Table) is the term I have used to express the series of notes to which the Resonator is tuned to produce in the voice the vowel sounds of language, and I believe that it is possible for most people to adopt this system of pronunciation without much difficulty. It is not the actual pitch of the resonant note which determines the vowel sound, but the position of the Resonator. When the normal centre, or the resonance of A, is once known, then the same variation of position will produce the notes of the scale, of which that is the foundation, in all voices alike. That is to say, the positions of the Resonator for all vowels are the same in different individuals—but when the resonances of A differ, the whole scale must be transposed accordingly.

I do not say that it is not possible to

Resonator Scale.

Average Bass Voice on c''



Average Soprano Voice on e'' b



I	U	who	too
II	.	owe	sew toe
III	O	or	ought
IV	.	on	wand
V	A	are	
VI	.	up	one ā(lone)
VII	.	earth birth	berth hurt worth
VIII	.	air mare	there (hat)
IX	.	met	head
X	E	mate	tail great
XI	.	hit	
XII	I	feet	meat

employ other positions, for an U can be made on a much lower resonance, and an I on a much higher one, than that given in the scale. But it is not necessary or comfortable to go to such extremes—and to be natural the voice must be allowed as much ease as is compatible with clear pronunciation. As it is, most of the faults in ordinary diction are due to the laziness of the tongue, lips, and jaw, and the Resonator Scale makes already a larger demand upon them than the ordinary slipshod pronunciation of common conversation. Moreover, a too great closure of the lips for U, and a too high front resonance for I, would constitute acoustical disadvantages.

Several of the vowel sounds in English are compound—that is, they are composed of two resonances in rapid succession—the accent falling on the first or last as may be.

Italian Sound.	Resonances on the Scale.	Example in English.
a - i	VI - XI	high - eye - fly - I
o - i	III - XI	boy - coin
a - u	V - I	how - count
i - u	XI - I	due - few - tune - you - Hugh
i - a	XI - VI	hear - here - peer - pier

When I forms part of a compound the short *i* XI is used, because the Resonator has not so far to move, and it has consequently grown to sound more natural. Similarly in ascending from and descending to A, as in "high" and "hear," the shallower unaccented *a* VI is preferable to the broad full A V. On the other hand, in the descent from A to U both the full resonances V and I are used, which gives roundness to the sound of "how." Any raising of the resonance of A to *a* VI or *er* VII or higher, produces the undesirable effect of the "cockney" accent—so often heard in this vowel sound. The letter W is in reality part of a compound vowel-sound, because it indicates that the Resonator must be shaped for the vowel U before uttering the vowel which follows it. Similarly the letter Y signifies the same thing with regard to the vowel I. They may both be regarded as methods of approaching a vowel from the bottom or top of the Resonator Scale—or as the first part of compounds of Resonance I or XII with any of the others.

When once the principle of the Resonator Scale is applied to the voice, it is only necessary to find the position upon it of any vowel-sound in any language, and it will then be possible to teach its pronunciation with some scientific accuracy. This requires a fine sense of hearing, as indeed all good pronunciation of foreign languages does, but a little practice will enable any one to hear the whispered resonances when he once knows what to listen for, and the maintenance of the position thus found will form the foundation of a habit of speaking. This application to foreign languages is such an extensive subject that I intend to discuss it separately.

The consonants, being various ways of opening and closing the vowels, are performed by movements of the Resonator in approaching or departing from its several positions. But as we are principally discussing the subject of resonances, we will only consider them here in so far as they affect that. I have already pointed out the great importance of an open jaw,

but many of the consonants require a more or less complete closure of it, so that in pronouncing a syllable considerable movement is necessary.

We may classify the consonants from this point of view as follows :—

Jaw fully open	H, L, K, G,
„ less „	T, D, N, R,
„ nearly closed, lips closed	P, B, M,
„ „ „ upper lip on } lower teeth }	F, V,
„ quite closed	S, Z, J, X, ch, sh,

With a view to keeping an open jaw for the vowels, it is desirable to maintain the full opening for H, L, K, G.

For T, D, N, R, a slight closure is necessary, especially when any emphasis upon the consonant is required, but it should be as little as possible.

Complete closure of the lips is demanded for P, B, M, but the teeth may remain somewhat apart, even when they are pronounced strongly.

In F and V the teeth come closer together, having only the lower lip between them.

In the others, S, Z, J, X, ch, sh, the teeth actually meet, and it is therefore necessary that the jaw should be quickly opened when they come before a vowel, so that the proper resonance may not be interfered with.

The English language is so full of closures of this kind that it is difficult to keep the Resonator open, and that accounts for one of the principal difficulties in singing it. The converse of this may be said of Italian, in which most words end in pure vowels, which keep the Resonator open. In fact it is this circumstance which has made the Italian language the basis of every kind of voice culture, and the producer of so many wonderful singers.

VI

THE VOCAL CORDS

THE vocal cords form the essentially musical instrument of the voice. They are what is known as a membranous reed, which throws the air passing through it into a state of vibration, and produces a note the pitch of which is regulated by the tightness with which the cords are stretched. There are examples of reeds made of metal and other materials in many of our musical instruments, but none of them are played upon by adjusting the tension of the reed itself, as in the voice. It is this regulation of the tension that has led to the erroneous analogy to stringed instruments, with which the voice has nothing else in common.

It must be borne in mind that we do not

owe the sound of the voice only to the fact that the current of air causes the cords to vibrate, but to the consequence of that, namely, the conversion of the air-stream into a series of sonorous undulations.

It is not an essential part of voice training to study the minute anatomy of the larynx. All information on the subject may be obtained from a standard text-book of Anatomy if desired. It is, however, good to know something of the mechanism of the vocal cords, in order to understand better what we do when using them.

The two membranous folds with strong elastic margins lie apart during ordinary breathing, except in front, where they are firmly attached to the thyroid cartilage and touch one another. All their movement is carried on at their posterior ends, which are brought together by a group of muscles—the adductors—and separated by another group—the abductors. Two further sets of muscles regulate the tension of the cords themselves, the first draws the cartilages, to which the posterior ends of the cords are attached, in a

backward direction, and at the same time tilts the thyroid cartilage, their front attachment, forwards. By this action the cords are stretched. The second set antagonises these and relaxes the cords.

Thus if we watch the vocal cords with a laryngoscope (compare diagrams in Fig. 8), we see that there is some distance between the cords in ordinary breathing, and a still wider separation on taking a deep breath. In whispering, the cords come much nearer, but there is sufficient room between their posterior ends to allow the air-stream to escape. This causes a rushing sound, without any distinctive pitch of its own, but sufficiently strong to awaken the resonant note of the cavity it enters.

If this passage is contracted still more a point is soon reached when the air-pressure below the glottis is enough to overcome the elasticity of the cords, causing them to vibrate. At the same time some of the air may be finding its way out between the posterior ends of the cords, or rather between the two cartilages to which they are attached. The effect of this



During whisper



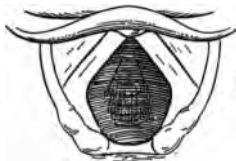
Soft vocal note



Strong vocal note



Ordinary respiration



Deep inspiration

Fig. 8.—Various Degrees of Approximation of the Vocal Cords.

To face p. 64.

is a soft note accompanied by a kind of aspirate, which costs a considerable amount of breath, but is frequently used in singing.

As the space between the cartilages is gradually closed, the same pressure will affect the cords still more, and their note grows louder until it reaches its full strength at the moment when the whole of the air-stream passes between the vibrating edges of the cords. In this state the strength of the note is regulated by the breath alone, and it is with the respiratory muscles that the pressure upon the vocal cords is increased or diminished, as we desire to make the voice loud or soft.

By a still stronger approximation of the cords so tight a stricture can be produced that they are no longer free to vibrate, and a state of strangulation ensues, in which the air can no longer pass out.

The sudden relaxation of this spasm, and the consequent bursting of the compressed air between the cords, is what is known as the "coup de glotte," an injurious method of obtaining a strong attack upon a note.

In gradually opening the glottis from the

ordinary vibrating position, the pressure in the windpipe is relieved by a free escape of air, and the note becomes soft again, until by a further separation it falls to a whisper and disappears.

That is the whole action of the vocal cords with regard to their approximation and separation, and we are conscious of a sense of compression in the throat when closure is complete, and of ease, accompanied by an escape of air (aspirate), when it is incomplete. These sensations bring the action of the muscles directly under the control of the will, and their separate nerve supply renders them independent of the other sets of muscles which regulate the tension of the cords.

The more the cords are stretched by the action of the tensors, the more rapid are their vibrations; and any degree of tension can be maintained, within the physical possibilities of the voice, so that the rate of vibration can be made to continue or to vary according to the action of the delicate muscles that pull upon the cords.

In this way the notes of the voice are pro-

duced, and any change in their pitch denotes a corresponding change of tension.

Another factor which plays a part in the pitch of the note is the length of the vocal cords. In men this is estimated at $\frac{7}{12}$ of an inch, and the vibrations which it accomplishes range in a bass voice from 75 to 354 per second, producing a compass of more than two octaves of notes from D to f', and in a tenor from 133 to 562, or from c-c''.

In women and boys the length is estimated at $\frac{5}{12}$ of an inch, and the range of a contralto voice is from 167 to 795 vibrations per second, or from e to g''; and of a soprano, 239 to 1417, or from b to f'''.

As the small difference between the length of the cords in men and women ($\frac{1}{6}$ inch) makes such an enormous difference in the pitch of the voice, it is highly probable that a slight difference also exists between bass and tenor, and between contralto and soprano, but it is difficult to measure with sufficient accuracy.

In watching the cords during vibration no change is observable, although a scale of more

than an octave may be sung; but in the extreme lower notes the cords are obviously not so tightly approximated as in the extreme high ones. It appears that in the latter firm approximation is a necessity, which accounts for the difficulty of singing higher notes in the soft, aspirated voice.

The vocal cords, then, are essentially the organ of sound and pitch; and they have one important peculiarity, namely, that they are not directly under the guidance of the will. We play upon them by ear, and we have no other means of controlling them than through the sense of hearing.

In those who are born deaf the voice remains mute. They can be taught to articulate with their lips and tongues, and even to make some sort of irregular sound, but the appreciation of the vocal note is to them an impossibility, as there is no sense of touch or strain which can take the place of hearing.

The pitch of any note which we utter voluntarily is determined by a mental perception of its sound, that is, we hear the note in our minds, and reproduce it. This can be

explained anatomically by the belief that the very special nerve which directs the action of the tensor muscles is intimately connected with the auditory nerve-centres, which act as an intermediary between the will and the vocal cords. This interesting fact has an important bearing upon the subject of vocalising. A strong and clear perception of every note is the only security for accurate intonation, and failure in this respect, from inherent defect or from fatigue or inattention, is the commonest cause of singing out of tune.

VII

FOREIGN VOWELS

THE pronunciation of foreign languages on the principle of the Resonator scale is so large a subject that it will only be possible here to make a few suggestions, to show how the system is applicable, and how it may be made the means of acquiring greater perfection in what is regarded now as a necessary accomplishment of every singer.

Any one who has developed the habit of using the proper positions for the five vowels, U, O, A, E, I, will have no difficulty in pronouncing them in Italian, French, or German when they occur, and all the other vowels find their places on the scale just as they do in English; only, every language has vowels which belong to it exclusively, apart from the

peculiar modifications frequently met with in dialects.

Italian vowels are all pure and uncomplicated, and the sounds are therefore fewer, so that some of the positions of the Resonator are not used.

They stand as follows :—

I	II	III	IV	V	VI
U	—	O	o	A	a
ūno	—	mōrto	bōcca	Āqua	ānno
VII	VIII	IX	X	XI	XII
—	—	e	E	i	I
—	—	ēlla	bēne	īn	rīso

Sometimes a fuller O II is heard in such words as fiōre, amōre, especially when strongly accentuated.

In the compounds such as ai, oi, ia, ea, ui, iu, ie, ei, io, each vowel is given its proper value. The accent is usually on the first, unless placed otherwise, as in più, già, etc.

In *French* we find the usual position on the scale allotted to those sounds with which we are already familiar, namely ;—

I	II	III	IV	V	VI
ou	eau	porte	botte	âme	halle

VII	VIII	IX	—	X	XI	XII
je	mère	elle	(aime)	est	il	vit

Of these the “je,” “le,” must be explained on account of their taking the same place as “her,” “earth,” etc. The only difference is that “je,” “le,” are pronounced short and sharp, whereas the same resonance in English is prolonged in “earth.” The same resonance is given to the final *e* “mute” which is pronounced in singing.

Also “mère” upon VIII is doubtful, as it does not appear to be quite a whole tone lower than the short *e* in *elle*.

The *ai* is another intermediate sound, and comes between the short *e* and the full *E*, that is between IX and X.

Next to be considered are the five nasal vowel sounds. In these the vowel is formed by the position of the mouth, but at the same time the soft palate falls, and admits the vibrations freely into the cavity of the nose. The exit of air through the mouth continues, but the air in the nasal cavity is set vibrating, and to the ordinary vowel sound the resonance of the nose is added.

The air stream does not pass through the nose as in pronouncing the consonant *n*, for that requires the stoppage of the air stream in the mouth by bringing the tongue up to the hard palate. The effect is produced by the addition of the nose resonance, which in itself cannot vary, as its walls are immovable. In French, however, the vowels which are made nasal have themselves been somewhat modified. *On* and *an* are simple combinations of the vowels O III and A V with the nasal resonance; but the same cannot be said of *en*, *un*, and *in*. Their position upon the scale is remarkable, for they arrange themselves around A or “*an*,” thus:—

III	IV	V	VI	VII
on	en	an	un	in

So that although the sounds are written as they are, some of them are in reality nasal compounds of other vowel sounds—for instance *en* is a nasal compound with the short *o*, and *un* with the light *a*, and has a parallel in the English pronunciation of the *u* in up.

“*In*” can be pronounced on a higher re-

sonance, but it gives a less sonorous sound than that on VII, which is, however, its lowest possible position.

Two sounds in French which are of especial interest are *eu* and *u*. They are not quite the same as the *ö* and *ü* in German, but physiologically they are analogous.

In describing the Resonator we distinguished those vowels which were formed by tuning it downwards by closing the lips, and those which were formed by tuning it upwards by moving the tongue. In these vowel sounds both these actions take place. The tongue rises as for *e* IX, but the closure for the lips to about the same distance as required for O III brings the resonance down to VIII, behind which I have been sometimes able to hear a back resonance a sixth lower like that of III.

“*Eu*” is therefore to be regarded as the double resonance of *e* IX in which the closure of the lips has tuned the resonance of that position down to VIII.

This is more remarkable in German when the same sound or near it is written *ö* or *oe*

indicating a blend of the two vowels *o* and *e*, which according to our Resonator scale we find it actually to be.

The French *u* is a similar blend of *U* I and *I* XII. By a greater closure of the lips than in *eu*, the front resonance of *I* XII is tuned down to X, and the back resonance like that of *I* can be heard at the same time. In other words, the tongue rises as for *I* XII, and the mouth closes as for *U* I.

The *ü* in German is not upon quite so high a resonance, and the tongue does not rise so much, but the description of its formation is the same as that of the French *u*.

The difference becomes apparent by comparing the pronunciation of the German words "höre" and "hühne," and the French "heure" and "une." In the former the *O* and *U* seem to have a larger share, while in the latter the *E* and *I* are more distinct. Such complex sounds as these are subject to considerable variations, but the widest positions with the deepest resonances are the best for singing purposes, provided that the clearness of the vowel remains.

Of the other compounds in French—

I	II	IX	X
ou	au	ai	ei

are pronounced as single vowels, only *oi* and *ui* deserve special attention.

Oi is a compound of O III and A V with the accent upon the latter.

Ui combines the modified $u \frac{x}{I}$ with I XII, the accent falling upon the latter. From our description of $u \frac{x}{I}$ it will be remembered that the tongue is already in position for I XII—so that the pronunciation of *ui* is performed entirely by the lips. This is a difficulty to most people, and we not infrequently hear the word “lui” spoken as if it were the Italian “lui” (loo-ee I XII), from a defective position of the tongue in the first vowel sound.

The general application of the scale to *German* words is as follows :

I	II	III	IV	V	VI
Muth	Noth	Wort	Wonne	Rath	Mann
VII	VIII	IX	X	XI	XII
(Lieb)e	Werth	Bett	Weh	in	ihm
(Werd)en					
höre		Hühne			

The c" Resonator Scale.



	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	U		O		A				e	E	i	I
Italian	uno		morto	bocca	acqua	anno			bella	bène	in	io
French	ou	eau (nasal)	or (nasal) on	botte en	âme an	halle un	jé in	{ VIII III heure	elle (aime) une { X I	est	il	vit
German	Muth	Noth	Wort	Wonne	Rath	Mann	(Lie)bé (Wer)den höre { VII III	Werth	Bett Hüh- / IX ne { I	Weh	Will	Wie
English	who	owe	or	on	art	ã(love) up	earth her	air	* end (at)	aim	ill	eat

The common unaccented terminations -e and -en are placed upon VII like je-le in French.

The compound vowel sounds are—

au	V - I	
ai ei	V - XI	{ broader than the English sound and rising from A V
ae or ä	X	
ie	XII	like a simple E
eu	III - XI	like a simple I
		like oi.

There is one important particular in which the study of foreign languages is of great service to the English singer, namely the maintenance of an open mouth. Italian, which is so full of vowels even at the ends of words, requires a continual opening of the lips, and it is not to be wondered at that the natural resonance so imparted to the voice has been instrumental in producing so many great singers. In French this is perhaps less the case, but is still so in great degree. The consonants at the ends of words are seldom sounded, and the *e* mute, although unpronounced in ordinary speaking, in reality denotes a silent opening and therefore some movement

of the jaw. German is so much more guttural and full of closes with *s* or *z* that it cannot be said to be favourable to resonance; but English is certainly worse, for all plurals, 3rd person singular of verbs, possessive cases, etc. ending in *s*, besides a great many words ending in *ch*, *sh*, are so constantly closing the mouth that it has become a not uncommon habit to keep the jaw closed the whole time of speaking. That such a proceeding does away with most of the resonance of the voice need hardly be said—and it is one of the grave difficulties met with in teaching English people to sing. In this respect the Welsh language is superior to ours, and therefore produces better voices. The effect of language upon the voice has yet to be fully investigated, but it is my belief that the habit of speaking has a great influence upon the growth of the Resonator, and therefore upon the fate of that part of the vocal instrument. The mere fact of learning foreign languages during youth exercises the control of the tongue and lips, and gives wider scope to their uses—and that in itself makes singing easier.

Since studying the Resonator, I have come to the conclusion that all languages may be pronounced upon the best acoustic principles, otherwise it would be impossible to sing them.—and that the selection of Italian was not because the study of music began in Italy or because Latin was the language of the Church—but for the plain physiological reason that the pure vowels of that language were best suited to the human requirements of Song.

VIII

PRACTICAL METHOD

THE practical method to be founded upon the foregoing studies of the vocal instruments will confine itself to the education of each of the component factors of the voice first by itself, and afterwards in combination. It may be set down as a principle that the development of the voice depends upon the proper cultivation of the Breath, the Resonator, and the Vocal Cords, both separately and together, and that the whole voice may be regarded as the resultant organ which is placed at the disposal of the artist whose aim is to express himself in song, a privilege which lies beyond the pale of special instruction. True teaching should limit itself to what is practical, for any attempt to dictate particular

methods of expressing emotions can only lead to affectation, a form of insincerity which rarely imposes upon any one. Our aim therefore should be to enable those who have the feelings and ideas to express in music, to obtain the means of acquiring the necessary mechanical power to do it.

This must be borne in mind when practising. Many exercises are in themselves dull or even ridiculous, but their object is to give greater strength and control in using all the muscles and senses connected with the use of the voice. It is as if we were to enter the workshop of Stradivarius and there to deal with all the pure materials of the instrument in the hope of one day producing something worthy of the Art.

A good apprenticeship in the craft is a positive necessity to the singer, who is not only put to some pains in forming a voice, but has to continue all through life maintaining and improving it.

IX

BREATHING EXERCISE

AFTER what has been said in the Chapter on Breathing, it will only be necessary to indicate the simple rules to be followed in exercising it.

The first point to be determined is the position in the chest where the most movement should take place.

Compare the chest before a mirror with the diagram given on page 30 (Fig. 2). Crossing the upper part of the abdomen about 1 inch below the top of the arch formed by the ribs in front, is the proper line of maximum expansion. At this level the circumference of the chest can be increased by nearly 2 inches, by full expansion of the lower ribs and the forward expansion of the upper

abdomen by descent of the diaphragm, as shown in Fig 1.

I have used a simple contrivance showing the increase of circumference on a scale.¹ It may be worn over the clothes while practising, and betrays unequivocally the behaviour of the breath. The principal points to be attended to in its use are its position, which should be upon the line of maximum expansion above described; and its tension, which denotes not only the amount of expansion, but also the extent to which a good reserve of breath is maintained.

When wishing to take a deeper breath it must be at that level and no other, and under no circumstance may there be any "pouting" of the upper ribs or any protrusion of the lower abdomen "below the belt."

When the position of the breathing has been fixed it will be safe to proceed with the exercises already suggested.

They should be done for at least half an hour daily while walking or cycling, and, it must be remembered, always through the nose

¹ Made for me by Mr. Montague, 101 New Bond Street.

only. Walking is on the whole the best for practice, as it allows more free movement of all limbs than cycling. Standing still before a pendulum is less good than either, as it readily leads to stiffness of the body.

For the improvement of the muscles and the control over them, rhythm is important, and should be adhered to strictly.

The breath is taken in evenly, without any jerks, during 3, 4, 5, 6, 7, 8, etc., steps, then held during the next 3, 4, 5, 6, 7, 8 steps, and then let gradually out during the next 3, 4, 5, 6, 7, 8 steps continuously—that is, without any pause between the end of one breath and the beginning of the next.

Holding the breath must be done by the chest muscles only, and not by closing the throat. There must not be the slightest click in the throat before expiration, which this improper closure would produce.

It is interesting to test the breathing capacity from time to time with a spirometer, to see whether it is increasing.

X

EXERCISE OF THE RESONATOR

GREAT care must be bestowed upon fixing the resonant note of the whispered vowel A.

Following the rules already given for the position of the mouth and tongue, the vowel should be whispered strongly with a proper breath until a definite note is heard. The throat must be made to open by an aspirate, as in the word "hard," or by the action which is sometimes seen to precede the polishing of a mirror.

With the assistance of a piano, or any other instrument available, the note can be then determined.

The next step is to divide a line of music into twelve bars numbered from I to XII. Under No. V is placed the resonant note just

obtained for the vowel A. Having completed the scale by carrying it up an octave to No. XII and down a fifth to No. I, the resonance of the five vowels U, O, A, E, I, will fall upon Nos. I, III, V, X, XII, respectively.

By reference to page 56 the position of the intermediate vowel-sounds may be filled in, and the Resonator Scale for that particular voice will be completed.

It is convenient to carry about a tuning fork of the same note as the basic resonance of A, that no opportunities may be lost of practising it correctly. In course of time the resonance may become deeper ; then the whole scale will have to be transposed.

It may be necessary to keep the jaw open by means of a prop (*e.g.*, a piece of wooden match an inch long) between the front teeth, and care must be taken to keep the tongue forward against the lower teeth.

It is best at first to devote your time to mastering the five positions for

I	III	V	X	XII
U	O	A	E	I

Starting with A,—

A - O - U — U - O - A

should be repeated in a whisper again and again, moving nothing but the lips—and hearing distinctly the resonances

I, III, V — V, III, I.

Starting again with A,—

A, E, I — I, E, A

are to be repeated with no movement except that of the tongue, listening carefully for the resonances

V, X, XII — XII, X, V.

The ears may be occasionally closed to make sure that the back resonance is also there.

These two exercises should be then performed in connection with the consonants, care being taken to keep the mouth open for the vowels, closing it only so far as the consonant demands.

1. H, L, K, G	}	I	III	V	X	XII
2. T, D, N, R		-U	-O	-A	-E	-I
3. P, B, M						
4. F, V						
5. S, Z, J, Sh, Ch						

When these monosyllables have been acquired, a great variety of duosyllabic sounds should be practised both on the same vowel and on different ones, the consonants being also varied.

Of sounds of two syllables there are an enormous number to be made out of the variation of the five vowels and eighteen consonants. It is good practice to go through the whole of the single syllables, doing the five vowels through twice with each consonant, and then to take each consonant in turn for the first syllable with the vowel U, and go through the whole of the other consonants with the five vowels as the second syllable.

It would take too long to practise more than one or two consonants in the first syllable at one time, so they should be gone through on successive days; and when they are finished the vowel may be changed, and so on, until at length all the possible combinations of two syllables composed of the five vowels and eighteen consonants have been practised.

Examples :—

	I I	I III	I V	I X	I XII
1	hu - hu " - lu " - ku " - gu " - tu " - du " - nu " - ru " - pu " - bu " - mu " - fu " - vu " - su " - zu " - ju " - shu " - chu	hu - ho " - lo " - ko " - go " - to " - do " - no " - ro " - po " - bo " - mo " - fo " - vo " - so " - zo " - jo " - sho " - cho	hu - ha " - la " - ka " - ga " - ta " - da " - na " - ra " - pa " - ba " - ma " - fa " - va " - sa " - za " - ja " - sha " - cha	hu - he " - le " - ke " - ge " - te " - de " - ne " - re " - pe " - be " - me " - fe " - ve " - se " - ze " - je " - she " - che	hu - hi " - li " - ki " - gi " - ti " - di " - ni " - ri " - pi " - bi " - mi " - fi " - vi " - si " - zi " - ji " - shi " - chi
2	III I ho - hu etc.	III III ho - ho etc.	III V ho - ha etc.	III X ho - he etc.	III XII ho - hi etc.
3	V I ha - hu	V III ha - ho	V V ha - ha	V X ha - he	V XII ha - hi
4	X I he - hu	X III he - ho	X V he - ha	X X he - he	X XII he - hi
5	XII I hi - hu	XII III hi - ho	XII V hi - ha	XII X hi - he	XII XII hi - hi

Whisper from left to right. When the whole has been practised as above, change the consonant in the first syllable and repeat.

Any of the compound or other vowels in the Resonator Scale may be used in the first syllable in conjunction with all the consonants in turn, and thus the exercise may be almost infinitely varied.

Vowels and consonants presenting special difficulties should be selected for constant practice, and it must never be forgotten that the jaw is to be well open for every vowel sound.

Lists of words should be compiled and practised, first of one syllable, and afterwards of two or more syllables, accustoming the ear to listen for the proper resonance of every vowel. They should be pronounced slowly at first, and gradually quickened.

Examples—

VI II	VI VI	III IX	IX VI-XI
alone	above	forget	de-light

III V XII X
foyer

V VII
ange

IV III V
endroit

{ X VIII
I III
lueur

{ X XII
I
lui

v xi v	xi vii	{ vii iii vii	{ ix i
einsam	stille	höre	schwül

Sentences such as the words of songs in various languages should be written out with the resonance numbers placed over their vowel sounds—and then pronounced as loudly and clearly as the whispering voice permits.

[*N.B.* Care must be taken, in these, as in all the exercises, to maintain a reserve of air by never entirely relaxing the expansion of the chest. At every vowel a slight movement is felt in the arch of the ribs in front, denoting that the muscles at that place are regulating the expenditure of breath.

A good deal more breath is required for loud whispering than for ordinary talking and even singing.]

In doing these advanced exercises of the Resonator, the words must be whispered very slowly, so that every resonance is distinct; and it is well to repeat them again and again, until they go quite easily. If any of the vowel sounds are found difficult, they should be practised by themselves, or in some of the exercises given earlier.

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Examples :—

XI XI IV $\widehat{\text{VI-XI}}$ I XI VII X XI X
It is not mine to sing the stately grace

VII X II XII XI XI $\widehat{\text{VI-XI}}$ X XI X
The great soul beaming in my lady's face

I $\widehat{\text{VI-XI}}$ II $\widehat{\text{V-I}}$ XI II I XII XI XI
To write no sounding odes to me is given

VIII XI VII $\widehat{\text{VI-XI}}$ V-I $\widehat{\text{VI-XI}}$ VII V XI IX
Wherein her eyes out shine the stars in Heaven,
etc. etc.

XII X VI V V VI III
S'il est un charmant gazon

VII VII $\widehat{\text{XI-IX}}$ V II VII
Que le ciel arrose

I XII VII IV I VII IX III
Ou brille en toute saison

IX VII { $\begin{smallmatrix} \text{VIII} \\ \text{III} \end{smallmatrix}$ X II VII
Quelque fleur éclore

I III { $\begin{smallmatrix} \text{VIII} \\ \text{III} \end{smallmatrix}$ XI V X VII VII
Ou l'on cueille à pleine main

XII X VII { $\begin{smallmatrix} \text{VIII} \\ \text{III} \end{smallmatrix}$ XI VII X VI VII
Lys, chevrefeuille et jasmin

IV { $\begin{smallmatrix} \text{VIII} \\ \text{III} \end{smallmatrix}$ IX VII VII VII VII
J'en veux faire le chemin

I III $\widehat{\text{XII X}}$ VII II VII
Ou ton pied se pose, etc. etc.

I XI XII $\widehat{V\ XI}$ VII I VII II III I $\left\{ \begin{smallmatrix} VII \\ III \end{smallmatrix} \right.$ I $\widehat{V\ XI}$
 Du bist wie eine Blume so hold und schön und rein

XI $\widehat{V-I}$ XI V I X I $\widehat{V-XI}$ XI XI IX XI $\widehat{V-XI}$
 Ich schau dich an und Wehmuth, schleicht mir ins Herz hinein

XI XI V II XI XII X VII $\widehat{V\ I}$ $\widehat{V-I}$ XI X VII IV
 Mir ist als ob ich die Hände, aufs Haupt dir legen sollt

X VII VI IV XI VIII VI VII II $\widehat{V\ XI}$ I $\left\{ \begin{smallmatrix} VII \\ III \end{smallmatrix} \right.$ I IV
 Betend dass Gott dich erhalte, so rein und schön und hold, etc.

XI

EXERCISE OF THE VOCAL CORDS

As it is not intended here to go far into the subject of vocalising, upon which there are works without number, I shall content myself with giving only a general outline of the exercises to be employed.

There are two sets of muscles to be developed and controlled—those of approximation and those of tension of the cords.

At all times the force employed must be regulated by the expansion of the chest and nothing else; and a hand, or our own sensations, should always be able to detect whether or not the muscles in the arch of the ribs are really controlling the incoming and outflowing of the air. If there is any difficulty in this respect, the expansion-band already

spoken of may be worn, and the movement of the breathing at the proper level carefully observed during the exercises.

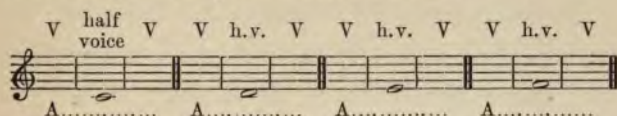
I have already pointed out that the pitch of a vocal note is dependent upon mental perception, that is, we must hear it quite clearly in our minds before we can sing it. It must be insisted, therefore, that before attempting to sing any note, a clear perception of it must be heard in the mind, no matter how rapidly the notes may succeed one another, or what the intervals are between them.

The exercises of approximation of the cords confine themselves to the passage from the whispering voice to the soft "aspirated" voice, and then on to the full voice—and back again.

Take a proper breath, and begin to whisper softly the vowel A, both the resonance and position of which must be carefully noted, then think of a note, not necessarily prompted by striking one on any instrument, and hear it clearly in your mind. Sing it softly in the aspirated or "half" voice without the slightest

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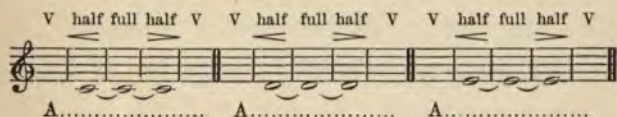
movement of the Resonator, and return again to the whispering voice. Listen immediately for the resonance, to discover if it has been altered by any unnecessary movement of tongue, etc. If we begin with the scale of C, this exercise may be written thus :—



and so on up an octave and down again.

Other scales can then be practised on the same principle, and on all of the vowels U, O, A, E, I, in turn.

The next step will be to carry the voice on to the “full voice,” when the vocal cords are strongly vibrating without any aspirate, and then return to the aspirated or “half” voice and back to a whisper.



This should be repeated on various scales both upwards and downwards, and upon all the five vowel sounds in turn.

The five major keys, a, b, b \flat , c, and c \sharp , lying well in the middle of the voice, are the best to practise. Considerable exercise of ear will be brought about by accurate attention to the whispered resonance before and after each note. This remains the same always, whatever discordant notes are performed on the vocal cords, and it requires considerable effort and perception to carry the mind to the notes of the scale of b major and c \sharp major when the resonant note of *A* is c". Another important feature is the maintenance of the unmoved Resonator which keeps its proper resonance all the time and gives to the vowel the same even quality or tone.

It will have been noticed that these exercises require a good deal of breath, and that most of it goes in the whispered vowel.

In practising vocalising it is not always possible to whisper the vowel sound in the same breath as the vocal exercise, but it should always be possible to whisper the vowel after the exercise by letting out the reserve air, as suggested in Mr. Shakespeare's *Art of Singing*. It is, however, always best to fix the

EXERCISE OF THE VOCAL CORDS 99

position of the Resonator by whispering before singing scales and other passages in order to be quite sure that the vowel sound is correct.

Among the simple exercises on vowels some of the most useful are those which vary the accent, such as ascending successions of three or more notes, repeated with the accent falling on the first, second, or third, etc.



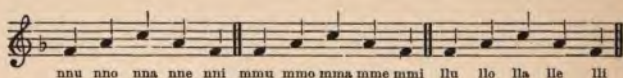
The accent must be given by regulation of the breath alone.

These and all the major or minor scales should be practised on each of the five vowels equally. It will be found fatiguing to the tongue to maintain the proper open position for E and I, and fatiguing to the lips to continue long upon U, O, but it is good to exercise them both thoroughly, taking an occasional rest upon A.

All the consonants combined with the vowels must be practised upon successions of notes, either in scales or arpeggio passages.

Those consonants which have any sound in them, such as l, m, n, r, v, b, g, z, must be accompanied by the vocal note to which they belong. Their pronunciation is too often heard associated with a sort of swoop which only reaches the proper note when the vowel is sounded. In singing all passages with these consonants, especially l, m, n, the vocal note must be heard with them, and must be opened on the vowel as if it were then being released.

In practising these it is well to exaggerate them somewhat, as follows :—



In connection with this part of our practising I should like to remind the reader of the old "solfeggi" of the Italian school. They have always played an important part in voice training and should continue to do so, since they are founded on a perfectly sound physiological principle in their conjunction of con-

sonants with the vowels. Too much vocalising upon single vowels should not be encouraged, as it frequently makes the voice hollow and uninteresting.

In properly studying a song, the first thing to do is to whisper the words slowly and carefully, giving to each vowel its proper resonance. When this has become easy by repetition it should be spoken or rather sung upon one note. If then all the words are clear and their proper meaning and emphasis well understood, the whole attention may be given to applying the vocal part to them and performing it with the phrasing which, as a musical composition, it demands.

Phrasing is often only half understood by singers because they have not mastered the words, and the continuity of the musical phrase is broken into and destroyed. Occasionally one hears the word "phrase" used as a synonym for "breath taking." It certainly is usual to include a whole musical phrase in one breath, but it means much more than that, and if the Resonator does not leave the vocal cords the freedom required for the full scope

of musical expression demanded from such an instrument, the effect will be marred. This is the real reason why I have insisted upon regarding the voice as a dual instrument. The whole act of singing is a great effort of the will. There are many things to be thought of at the same time, and the intellectual and emotional sides of the art have to be included within the limits of a single performance. The idea of the poet and the musician should be identical; but, nevertheless, the singer has to express that idea in two ways simultaneously.

The Resonator and the vocal cords should be regarded as separate organs which combine both sense and sound in the happy union of poetry and song.

THE END

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